

32267PC01

13

CLAIMS

1. A wind turbine lightning protection means, said means comprising means for conducting an electrical current induced by a lightning, said means capable of conducting the electrical
5 current from blades of the wind turbine, and said means comprising electrical conductor means passing along the base of the blades, through the hub and to a stationary part of the wind turbine by leading the electric conductor means past a flange for mounting the hub to a main shaft of the wind turbine, said stationary part of the wind turbine being stationary in relation to the mounting flange during operation of the wind turbine, and
10 where leading of the electrically conducting means past the mounting flange is established by one of the following means: Fastening means provided in or attached to the circumference of the mounting flange for fastening the electrically conducting means to the circumference of the mounting flange, or through-going holes in the mounting flange for passing the electrically conducting means through the mounting flange.
- 15
2. A wind turbine lightning protection system according to claim 1, said electrical conductor means leading past the mounting flange electrically insulated from the mounting flange.
3. A wind turbine lightning protection means according to claim 1 or claim 2, where leading
20 of the electrical conductor means past the mounting flange are provided by leading the electrical conductor means past the circumference of the mounting flange.
4. A wind turbine lightning protection system according to claim 3, where electrical insulation is provided between the electrical conductor means and the circumference of the
25 mounting flange.
5. A wind turbine lightning protection means according to claim 1 or claim 2, where leading of the electrical conductor means past the mounting flange are provided by leading the electrical conductor means through the mounting flange.
- 30
6. A wind turbine lightning protection system according to claim 5, where electrical insulation is provided between the electrical conductor means and holes in the mounting flange.
- 35 7. A wind turbine lightning protection means according to any of the preceding claims, where the electrically conductor means comprises an annular member provided around the main shaft of the wind turbine, and said annular member being electrically insulated from the mounting flange and from the main shaft.

AMENDED SHEETS

32267PC01

14

8. A wind turbine lightning protection means according to claim 7, where the annular member is attached to the mounting flange, thus rotating with the mounting flange, the main shaft and the hub during operation of the wind turbine, and where slip means are provided between the annular member and the stationary part of the wind turbine, said
- 5 slip means conducting the electrical current from the annular member to the stationary part.
9. A wind turbine lightning protection means according to claim 7, where the annular member is attached to the stationary part of the wind turbine, thus not rotating with the
- 10 mounting flange, the main shaft and the hub during operation of the wind turbine, and where slip means are provided between the annular member and the mounting flange, said slip means conducting the electrical current from the mounting flange to the annular member.
- 15 10. A wind turbine lightning protection means according to claim 8 or claim 9, where the slip means are a number of metal brushes abutting the annular member and sliding along the annular member, when the mounting flange is rotating during operation of the wind turbine.
- 20 11. A wind turbine lightning protection means according to claim 8 and claim 10, where the slip means being a number of metal brushes abutting the annular member and sliding along the annular member, is secured to the stationary part of the wind turbine.
- 25 12. A wind turbine lightning protection means according to claim 9 and claim 10, where the slip means being a number of metal brushes abutting the annular member and sliding along the annular member, is secured to the mounting flange.
- 30 13. A wind turbine lightning protection means according to claim 8 or claim 9, where the slip means are a number of carbon brushes abutting the annular member and sliding along the member, when the mounting flange is rotating during operation of the wind turbine.
- 35 14. A wind turbine lightning protection means according to claim 8 and claim 13, where the slip means being a number of carbon brushes abutting the annular member and sliding along the annular member, is secured to the stationary part of the wind turbine.
15. A wind turbine lightning protection means according to claim 9 and claim 13, where the slip means being a number of carbon brushes abutting the annular member and sliding along the annular member, is secured to the mounting flange.

MENDEED SHEETS

32267PC01

15

16. A wind turbine lightning protection means according to claim 8 or claim 9, where the slip means are a number of spatial gaps, said gaps constituting spark gaps for the electrical current to pass in the form of sparks from the annular member.
- 5 17. A wind turbine lightning protection means according to claim 8 and claim 16, where the slip means being a number of gaps is established between the annular member and a number of lightning current receptors, said receptors being secured to the stationary part of the wind turbine.
- 10 18. A wind turbine lightning protection means according to claim 9 and claim 16, where the slip means being a number of gaps is established between the annular member and a number of lightning current receptors, said receptors being secured to the mounting flange.
- 15 19. A wind turbine lightning protection system according to any of claims 16-18, where the receptors is constituted by a pointed end neighbouring a surface of the annular member substantially lying in a plane perpendicular to a rotating axis of the main shaft,
- 20 20. A wind turbine lightning protection system according to any of claims 16-18, where the receptors is constituted by a pointed end neighbouring an inner circumference of the annular member, said circumference surrounding the rotating axis of the main shaft,
- 25 21. A wind turbine lightning protection system according to any of claims 16-18, where the receptors is constituted by a pointed end neighbouring an outer circumference of the annular member, said circumference surrounding the rotating axis of the main shaft,
- 30 22. A wind turbine lightning protection system according to any of claims 16-21, where a radial distance in relation to the rotating axis of the main shaft between the annular member and the pointed end of each of the lightning current receptors is smaller than an axial distance in relation to the rotating axis of the main shaft between the annular member and the remainder of each of the lightning current receptors.
- 35 23. A wind turbine lightning protection system according to any of claims 16-21, where an axial distance in relation to the rotating axis of the main shaft between the annular member and the pointed end of each of the lightning current receptors is smaller than a radial distance in relation to the rotating axis of the main shaft between the annular member and the remainder of each of the lightning current receptors.

AMENDED SHEETS

32267PC01

16

24. A wind turbine lightning protection system according to any of claims 16-23, where the pointed tip of the lightning current receptor is cylindrically shaped with the pointed end of the cylindrical shape being directed towards the annular member.
- 5 25. A wind turbine lightning protection system according to any of claims 16-23, where the pointed tip of the lightning current receptor is conically shaped with the pointed end of the conical shape being directed towards the annular member.
- 10 26. A wind turbine lightning protection system according to any of claims 16-23, where the pointed tip of the lightning current receptor is frusto-conically shaped with the pointed end of the frusto-conical shape being directed towards the annular member.
- 15 27. A wind turbine lightning protection system according to any of claims 16-23, where the pointed tip of the lightning current receptor is pyramidally shaped with the pointed end of the pyramidal shape being directed towards the annular member.
- 20 28. A wind turbine lightning protection system according to any of claims 16-23, where the pointed tip of the lightning current receptor is triangularly shaped with the pointed end of the triangular shape being directed towards the annular member.
- 25 29. A wind turbine lightning protection system according to any of claims 16-23, where the pointed tip of the lightning current receptor is shaped like a fork with a number of prongs with the pointed end of the number of prongs being directed towards the annular member.
- 30 30. A wind turbine lightning protection means according to any of claims 7-29, where the annular member is attached to the stationary part of the wind turbine, thus not rotating with the mounting flange, the main shaft and the hub during operation of the wind turbine, and where slip means are provided between the annular member and the mounting flange, said slip means conducting any static electricity, being formed apart from the the electrical current of the lightning, from the mounting flange to the annular member.
- 35 31. A wind turbine lightning protection means according to claim 30, where the slip means are a number of metal brushes abutting the annular member and sliding along the annular member, when the mounting flange is rotating during operation of the wind turbine.
32. A wind turbine lightning protection means according to claim 30, where the slip means being a number of metal brushes abutting the annular member and sliding along the annular member, is secured to the stationary part of the wind turbine.

AMENDED SHEETS

32267PC01

17

33. A wind turbine lightning protection means according to claim 31 and claim 32, where the slip means being a number of metal brushes abutting the annular member and sliding along the annular member, is secured to the mounting flange.

5 34. A wind turbine lightning protection means according to claim 30, where the slip means are a number of carbon brushes abutting the annular member and sliding along the member, when the mounting flange is rotating during operation of the wind turbine.

35. A wind turbine lightning protection means according to claim 30, where the slip means
10 being a number of carbon brushes abutting the annular member and sliding along the annular member, is secured to the stationary part of the wind turbine.

36. A wind turbine lightning protection means according to claim 34 and claim 35, where the slip means being a number of carbon brushes abutting the annular member and sliding
15 along the annular member, is secured to the mounting flange.

37. A wind turbine lightning protection means according to claim 30, where the slip means are a number of spatial gaps, said gaps constituting spark gaps for the static electricity to pass in the form of sparks from the annular member.

20

38. A wind turbine lightning protection means according to claim 30, where the slip means being a number of gaps is established between the annular member and a number of static discharge units, said units being is secured to the stationary part of the wind turbine.

25 39. A wind turbine lightning protection means according to claim 30, where the slip means being a number of gaps is established between the annular member and a number of static discharge units, said units being secured to the mounting flange.

40. Method for conducting electrical current induced by lightning from the blades of a wind
30 turbine to a stationary part of the wind turbine in relation to a mounting flange of the wind turbine, said method comprising passing the electrical current along electrical conductors and past the mounting flange from a front side of the mounting flange to a rear side of the mounting flange and past the circumference of the mounting flange.

35 41. Method for conducting electrical current induced by lightning from the blades of a wind turbine to a stationary part of the wind turbine in relation to a mounting flange of the wind turbine, said method comprising passing the electrical current along electrical conductors through the mounting flange from a front side of the mounting flange to a rear side of the mounting flange.

AMENDED SHEETS

32267PC01

18

42. Use of a mounting flange of a wind turbine for conducting electrical current, induced by a lightning, along electrical conductors extending from the blades of the wind turbine.

AMENDED SHEETS

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☒ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.